

APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTORS: Yoon-Taek JUNG and Sung-Kyun PARK

TITLE: METHOD FOR PROCESSING AUTHENTICATION  
FAILED/AUTHORIZATION DENIED SUBSCRIBERS BY  
INTELLIGENT NETWORK

ATTORNEYS: FLESHNER & KIM, LLP  
& P. O. Box 221200  
ADDRESS: Chantilly, VA 20153-1200

DOCKET NO.: P-163

102070-60605260

METHOD FOR PROCESSING AUTHENTICATION  
FAILED/AUTHORIZATION DENIED  
SUBSCRIBERS BY INTELLIGENT NETWORK

BACKGROUND OF THE INVENTION

5      1.      Field of the Invention

The present invention relates to an intelligent network, and more particularly to a method for processing authentication failed/authorization denied subscribers by intelligent network.

10      2.      Background of the Related Art

A communication service network typically uses an authentication function to confirm the legitimacy of a subscriber, as well as an authorization function for the subscriber for suspending the authorization of the subscriber over when a lost terminal is used or if payment for a service fee has not been made.

15      In case of a mobile communication service network, since a terminal is physically separated from the network, there is a high possibility that the terminal will be lost or stolen, or that a stranger illegally duplicates a terminal of a legitimate subscriber for illegal use.

In an effort to solve such problems, in the mobile communication service network, the authentication function and the authorization denial function have been positively and actively introduced for the subscriber when he or she requests origination of a call.

However, when authentication for the terminal which attempts a call origination fails, it is necessary to take an appropriate step to identify the person who is using the terminal and to judge his or her legitimacy.

Even when a terminal for which authorization has been denied as having been lost or stolen is still used, it is necessary to identify the person using the terminal to take an appropriate step.

Also, even when the subscriber is subject to an authorization denial due to a delay in payment for service fee, it is necessary to first provide a normal call service together with a proper announcement for a certain period of time to inform the person of expected suspension of the service, or make a phone call to a person in charge of the subscriber of the service network to lead him or her toward a normal service.

Further, when the authentication of the subscriber fails or the authorization of the subscriber is denied for some reason, an appropriate announcement or a normal call service should be provided to the subscriber depending on situations.

In addition, even though the subscriber is qualified, the authentication may fail for some reason. In this case, normal service should be provided immediately to the corresponding subscriber.

In the related art communication service network, when subscriber authentication fails or is denied for an attempted call, the service for the corresponding subscriber is unconditionally disconnected. It thus becomes difficult to identify the corresponding subscriber, judge his or her legitimacy, provide an announcement depending on situations or provide a normal call service. It is also difficult to lead to a normal service, through a communication with the corresponding subscriber or the person in charge of the subscriber in the service center.

Figure 1 illustrates a related art method for processing a call originated by a subscriber for whom authentication has failed or been denied in a communication network service.

As shown in the drawing, when a subscriber terminal 1, including information on its own terminal, attempts to originate a call to MSC/VLR or to a switching system/SSF2 (S10), the MSC/VLR or the switching system/SSF analyzes the information of the terminal that attempted the call origination to determine whether it has been authenticated and authorized (S11).

If the call origination is from a rightful terminal, the MSC/VLR or the switching system/SSF analyzes a phone number of the called party and attempts to set up a call. If, however, the call origination is determined to have been received from an authentication-failed terminal or from an authorization-denied terminal, a simple announcement message provided from the switching system 2 is transmitted to the

terminal 1 that attempted the call origination and immediately releases the service for the corresponding call.

The service for the authentication-failed or authorization-denied subscriber is also made in the same way in an intelligent network, which will now be described with reference to Figure 2.

Figure 2 is a flow chart of a BCSM (Basic Call State Model) for processing an originated call as defined by a North American wireless standard mobile communication intelligent network (Wireless Intelligent Network (WIN)) standard in accordance with the related art.

As shown in Figure 2, when a Point In Call (PIC1) detects a call originated from a terminal, the corresponding PIC1 performs an event processing for the detected call and shifts to the next stage for an intelligent network service.

A Point In Call 2 (PIC2) performs an authenticating procedure and checks its authorization to determine whether the call has been received from a normal subscriber terminal. If the call is determined to have been received from a normal subscriber terminal and thus authentication and authorization are given thereto, it shifts to the next stage.

A Point In Call 3 (PIC3) collects initial information included in the corresponding originated call, that is, a service code, a telephone exchange number, and a called party number. If the time allocated for collecting information elapses, an exceptional process

is performed to return to an initial routine. If, however, the information for the originated call is normally collected within a pre-set time period, it shifts to the next stage.

After a detection point process is performed on the information collected by a third detection point (DP3), the collected information is analyzed by a PIC4.

5  
549  
92  
If the analyzed information is invalid to set up a call, the information is processed as an exceptional case and returns to the initial routine. When analysis for information on an valid originated call is completed, it shifts to the next stage.

After a detection point process on the information analyzed by a fourth detection point (DP4) is performed, a route desired to set up a call is selected by a Point In Call 5 (PIC5) and a set-up processing to set up a call is performed for the authenticated call through the route selected by a PIC6.

10750505-010201  
15 If a failure occurs in the route selected by the PIC6 and is detected by a fifth detection point (DP5), an exceptional process is performed to return to the initial routine. Meanwhile, if a failure occurs in set-up processing for the authenticated signal, the exceptional process is performed to return to the initial routine.

20 If the call is set-up normally, a call to a corresponding destination is made by a Point In Call 7 (PIC7). Then, a routine in which a ring back tone is transferred and a destination response awaits is performed by a PIC8. Next, a routine in which the originated call is activated is performed by a PIC9, and a routine in which the originated call is suspended is performed by a PIC10.

If a failure is detected in a routine of each PIC, an exceptional processing routine is performed for the corresponding processing operation, and the process returns to the initial routine, and if suspension of the originated call is detected, the process returns to the initial routine.

5           If PIC2 fails authentication or denies the authorization for the originated call detected by the first detection point (DP1), the call service is suspended, and an exceptional process is performed and returns to the initial routine.

Figure 3 is a flow chart of a related art BCSM (Basic Call State Model) for processing an originated call according to a ITU-T standard in an intelligent network.

As shown in Figure 3, when a point in call 21 (PIC21) detects a call originated from a terminal, the PIC21 performs an event processing for the detected call and shifts the process to the next stage for an intelligent network service.

A Point In Call 22 (PIC22) perform an authenticating procedure and checks its authorization to determine whether the call has received from a normal subscriber terminal. If the call is determined to have been received from a normal subscriber terminal and authentication and authorization are given, the PIC22 shifts the process to the next stage.

A Point In Call 23 (PIC23) collects initial information included in the corresponding originated call, that is, a service code, a telephone exchange number, and a destination number. If the time allocated for collecting information elapses, an

exceptional process is performed to return to an initial routine. If, however, the PIC23 normally collects information within a pre-set time period, the process shifts to the next stage.

After a detection point process is performed on the information collected by a third detection point (DP23), the collected information is analyzed by a PIC24. If the analyzed information is invalid to set up a call, the information is processed as an exceptional case, and returns to the initial routine. After analysis of information on a valid originated call is completed, the process shifts to the next stage.

After a detection point process on the information analyzed by a fourth detection point (DP24) is performed, a route desired to set up a call is selected by a Point In Call (PIC25), and a set-up processing to set up a call is performed for the authenticated call through the route selected by a Point In Call 26 (PIC26).

If a fifth detection point (DP25) detects a failure in the route selected by the PIC26, an exceptional process is performed to return to the initial routine. Meanwhile, a failure occurs in set-up processing for the authenticated signal, the exceptional process is performed to return to the initial routine.

If the call set-up is normally performed, a call to a corresponding destination is made by a Point In Call 27 (PIC27). Then, a routine in which a ring back tone is transferred and a destination response awaits is performed by a PIC28. Next, a routine



in which the originated call is activated is performed by a PIC29, and a routine in which the originated call is suspended is performed by a PIC30.

If a failure is detected in a routine of each Point In Call (PIC), an exceptional processing routine is performed for the corresponding processing operation and the process returns to the initial routine. If suspension of the originated call is detected, the process returns to the initial routine.

If the PIC22 fails authentication or denies the authorization for the originated call detected by the first detection point (DP21), call service is suspended and an exceptional process is performed and returns to the initial routine.

An attempted call defined in an intelligent network of a GSM/UMTS (Global System for Mobile/Universal Mobile Telecommunications System), and especially, in a CAMEL (Customized Applications for Mobile network Enhanced Logic) will now be described.

Figure 4 is a flow chart of a related art BCSM (Basic Call State Model) showing a process of an originated call which is applied to an intelligent network of GSM/UMTS (for example a CAMEL standard).

As shown in Figure 4, when an event for an originated call is detected by a Point In Call (PIC41), PIC41 detects authentication and authorization of the call and its initial information and requests analysis of the information for processing the call.

09505260  
T020T0"60605260

After a detection point process is performed on the information collected by a first detection point (DP41), the information collected for the call is analyzed by a Point In Call (PIC42). If the analyzed information is invalid, the information is processed as an exceptional case, and the process returns to the initial routine. Meanwhile, if the analyzed information is determined to be valid, the process shifts to the next stage.

After a fourth detection point (DP42) performs a detection point process on the information analyzed, a Point In Call 43 (PIC43) selects a route for setting up a call and sets up a call set-up message.

If a failure is detected in the route selected by the third detection point DP43, or it is detected that the route selected by a fourth detection point DP44 is in use, or if no response is detected for the call set-up message through the route selected by a fifth detection point DP45, an exceptional process is performed to return to the initial routine. If a call is set up through the selected route, however, the Point In Call (PIC44) activates the call.

The related art mobile communication network has various problems. For example, an authentication and authorization is analyzed for a terminal which attempts to originate call. If, based on the analysis, the terminal is determined to be disqualified or its authentication fails for some reason, service is unconditionally disconnected with the call originated from the terminal. This result in problems that the corresponding

subscriber is not identified, it is hard to judge legitimacy of the corresponding terminal, and a proper measure is not able to be taken for the corresponding terminal.

Additionally, the unconditional disconnecting of the service disadvantageously prohibits the guiding the subscriber who has delayed payment of a service fee to pay and inducing him or her to a normal subscriber.

The above references are incorporated by reference herein where appropriate for appropriate teachings of additional or alternative details, features and/or technical background.

### SUMMARY OF THE INVENTION

An object of the invention is to solve at least the above problems and/or disadvantages and to provide at least the advantages described hereinafter.

An object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network, which substantially obviates problems caused by limitations and disadvantages in the related art.

Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network in which if authentication of a call originated by a subscriber fails, or if authorization is denied in a communication service network, a phone communication is connected to a service center or to a phone number designated by the subscriber of the corresponding terminal.

Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network wherein if authorization is denied in a communication service network, a phone communication is connected to a special service equipment such as an IP (Intelligent Peripheral).

5 Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network wherein if authorization is denied in a communication service network, the call is processed as a normal one.

Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network wherein if authorization is denied in a communication service network, the identity of the subscriber is recognized, and the subscriber's legitimacy is determined.

10 Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network wherein if authorization is denied in a communication service network, various announcements suitable to corresponding situations are provided, or a normal call service is provided to the subscriber.

15 Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network wherein if authorization is denied in a communication service network, communication is

20

established between the subscriber and a person in charge of the subscriber in a service center, thereby inducing the subscriber toward a normal service.

5  
50  
A3  
Another object of the present invention is to provide a method for processing authentication failed/authorization denied subscribers by an intelligent network wherein if authorization is denied in a communication service network, a call of a subscriber that has been authentication-failed and authorization-denied is automatically traced and its history is automatically maintained, and various steps and service are prepared to be provided by a communication service network provider to the authentication-failed and authorization-denied subscriber, to suitably handle the situations.

10  
10975909 " 010201  
To achieve at least these advantages, in whole or in parts, there is provided a method for processing authentication failed/authorization denied subscribers by intelligent network including an Origination\_Attempt\_Unauthorized detection point for performing a corresponding processing operation according to an instruction of an SCP (Service Control Point) in case that a subscriber who attempts to originate a call in an  
15 intelligent network service is authentication-failed or authorization-denied.

To achieve at least these advantages in whole or in parts, there is further provided a method for processing authentication failed/authorization denied subscribers by intelligent network comprising a step in which an Origination\_Attempt\_Unauthorized detection point detects an authentication failure or authorization denial for a subscriber  
20 who has originated a call and informs an SCP of the corresponding fact; a step in which

the SCP instructs that the call originated by the subscriber is connected to a predetermined location; and a step in which the subscriber whose call has been authentication-failed or authorization-denied is induced to a normal service according to the instruction of the SCP.

5           To achieve at least these advantages in whole or in parts, there is further provided a method for processing authentication failed/authorization denied subscribers by intelligent network including the steps of analyzing the authentication and authorization of a subscriber who originated a call when the call is detected by a mobile switching system; judging whether an authorization failure trigger is in a state of activation in case that the subscriber is authorization-denied; releasing the call according to a procedure defined in the switching system in case that the authorization denial trigger is in a state of non- activation, or transferring an Origination Request INVOKE message, in case of an intelligent network of a North American wireless standard, including a parameter indicating the reason for the authentication failure or the authorization denial against the  
15 subscriber and location information of the subscriber, or an initial detection point message, in case of an intelligent network of an ITU or a GSM/UMTS, to an SCP which handles the corresponding trigger, in case that the authorization denial trigger is in a state of activation; transmitting an origination request return result message or a connection message for connecting the call originated by the subscriber to a predetermined location,  
20 to the switching system according to analysis of the origination request message or the

initial detection point message; and connecting the call originated by the subscriber to a corresponding location according to the origination request return result message or the connection message.

Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realized and attained as particularly pointed out in the appended claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

Figure 1 is a schematic view showing a related art method for processing a call origination of a subscriber for whom authentication has failed or for whom authorization is denied in a communication network service;

Figure 2 is a flow chart illustrating a related art BCSM (Basic Call State Model) showing a process of an originated call according to a WIN (Wireless Intelligent Network) standard in an intelligent network;

Figure 3 is a flow chart illustrating a related art BCSM (Basic Call State Model) showing a process of an originated call according to a ITU-T standard in an intelligent network;

Figure 4 is a flow chart illustrating a related art related art BCSM (Basic Call State Model) showing a process of an originated call according to a CAMEL standard in an intelligent network;

Figure 5 is a flow chart of a method for processing of an authentication-failed or an authorization-failed subscriber in a communication network service in accordance with a preferred embodiment of the present invention;

Figure 6 is a flow chart of a BCSM (Basic Call State Model) showing a process of an originated call according to a WIN (Wireless Intelligent Network) standard in an intelligent network in accordance with a preferred embodiment of the present invention;

Figure 7 is a flow chart of a BCSM (Basic Call State Model) showing a process of an originated call according to a ITU-T standard in an intelligent network in accordance with a preferred embodiment of the present invention;

Figure 8 is a flow chart of a BCSM (Basic Call State Model) showing a process of an originated call according to a CAMEL standard in an intelligent network in accordance with a preferred embodiment of the present invention;



Figures 9A and 9B are a flow chart of a call connection service between a terminal and a switching system where an originated call is subject to an authentication failure or an authorization denial in the communication network service of the WIN standard in accordance with a preferred embodiment of the present invention;

Figures 10A and 10B are a flow chart illustrating a call connection service between a terminal and a switching system where an originated call is subject to an authentication failure or an authorization denial in the communication network service of the ITU-T standard in accordance with a preferred embodiment of the present invention; and

Figures 11A and 11B are a flow chart illustrating a call connection service between a terminal and a switching system in case that an originated call is subject to an authentication failure or an authorization denial in the communication network service of the CAMEL standard in accordance with the present invention;

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 5 is a flow chart of a method for processing an authentication-failed or an authorization-denied subscriber in a communication network service in accordance with a preferred embodiment of the present invention. The steps of the method of Figure 5 will be referred to throughout the specification as appropriate.

The preferred embodiment preferably includes a detection point for informing of an authentication failure or an authorization denial for an originated call as it occurs in an intelligent network standard of BCSM, collecting and analyzing information on the originated call according to an instruction from a Service Control Point (SCP), and  
5 selecting a route for setting up a call. If the subscriber who attempts to originate a call is authentication-failed or authorization-denied, an authorization failure trigger type is preferably defined to inform the SCP of the situation and execute a processing routine according to an instruction of the SCP.

Figure 6 is a flow chart of a BCSM (Basic Call State Model) showing a process of an originated call in a mobile communication intelligent network of the North America in accordance with a preferred embodiment of the present invention. The process preferably relates to a WIN (Wireless Intelligent Network).

10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95  
100  
105  
110  
115  
120  
125  
130  
135  
140  
145  
150  
155  
160  
165  
170  
175  
180  
185  
190  
195  
200  
205  
210  
215  
220  
225  
230  
235  
240  
245  
250  
255  
260  
265  
270  
275  
280  
285  
290  
295  
300  
305  
310  
315  
320  
325  
330  
335  
340  
345  
350  
355  
360  
365  
370  
375  
380  
385  
390  
395  
400  
405  
410  
415  
420  
425  
430  
435  
440  
445  
450  
455  
460  
465  
470  
475  
480  
485  
490  
495  
500  
505  
510  
515  
520  
525  
530  
535  
540  
545  
550  
555  
560  
565  
570  
575  
580  
585  
590  
595  
600  
605  
610  
615  
620  
625  
630  
635  
640  
645  
650  
655  
660  
665  
670  
675  
680  
685  
690  
695  
700  
705  
710  
715  
720  
725  
730  
735  
740  
745  
750  
755  
760  
765  
770  
775  
780  
785  
790  
795  
800  
805  
810  
815  
820  
825  
830  
835  
840  
845  
850  
855  
860  
865  
870  
875  
880  
885  
890  
895  
900  
905  
910  
915  
920  
925  
930  
935  
940  
945  
950  
955  
960  
965  
970  
975  
980  
985  
990  
995  
1000  
1005  
1010  
1015  
1020  
1025  
1030  
1035  
1040  
1045  
1050  
1055  
1060  
1065  
1070  
1075  
1080  
1085  
1090  
1095  
1100  
1105  
1110  
1115  
1120  
1125  
1130  
1135  
1140  
1145  
1150  
1155  
1160  
1165  
1170  
1175  
1180  
1185  
1190  
1195  
1200  
1205  
1210  
1215  
1220  
1225  
1230  
1235  
1240  
1245  
1250  
1255  
1260  
1265  
1270  
1275  
1280  
1285  
1290  
1295  
1300  
1305  
1310  
1315  
1320  
1325  
1330  
1335  
1340  
1345  
1350  
1355  
1360  
1365  
1370  
1375  
1380  
1385  
1390  
1395  
1400  
1405  
1410  
1415  
1420  
1425  
1430  
1435  
1440  
1445  
1450  
1455  
1460  
1465  
1470  
1475  
1480  
1485  
1490  
1495  
1500  
1505  
1510  
1515  
1520  
1525  
1530  
1535  
1540  
1545  
1550  
1555  
1560  
1565  
1570  
1575  
1580  
1585  
1590  
1595  
1600  
1605  
1610  
1615  
1620  
1625  
1630  
1635  
1640  
1645  
1650  
1655  
1660  
1665  
1670  
1675  
1680  
1685  
1690  
1695  
1700  
1705  
1710  
1715  
1720  
1725  
1730  
1735  
1740  
1745  
1750  
1755  
1760  
1765  
1770  
1775  
1780  
1785  
1790  
1795  
1800  
1805  
1810  
1815  
1820  
1825  
1830  
1835  
1840  
1845  
1850  
1855  
1860  
1865  
1870  
1875  
1880  
1885  
1890  
1895  
1900  
1905  
1910  
1915  
1920  
1925  
1930  
1935  
1940  
1945  
1950  
1955  
1960  
1965  
1970  
1975  
1980  
1985  
1990  
1995  
2000  
2005  
2010  
2015  
2020  
2025  
2030  
2035  
2040  
2045  
2050  
2055  
2060  
2065  
2070  
2075  
2080  
2085  
2090  
2095  
2100  
2105  
2110  
2115  
2120  
2125  
2130  
2135  
2140  
2145  
2150  
2155  
2160  
2165  
2170  
2175  
2180  
2185  
2190  
2195  
2200  
2205  
2210  
2215  
2220  
2225  
2230  
2235  
2240  
2245  
2250  
2255  
2260  
2265  
2270  
2275  
2280  
2285  
2290  
2295  
2300  
2305  
2310  
2315  
2320  
2325  
2330  
2335  
2340  
2345  
2350  
2355  
2360  
2365  
2370  
2375  
2380  
2385  
2390  
2395  
2400  
2405  
2410  
2415  
2420  
2425  
2430  
2435  
2440  
2445  
2450  
2455  
2460  
2465  
2470  
2475  
2480  
2485  
2490  
2495  
2500  
2505  
2510  
2515  
2520  
2525  
2530  
2535  
2540  
2545  
2550  
2555  
2560  
2565  
2570  
2575  
2580  
2585  
2590  
2595  
2600  
2605  
2610  
2615  
2620  
2625  
2630  
2635  
2640  
2645  
2650  
2655  
2660  
2665  
2670  
2675  
2680  
2685  
2690  
2695  
2700  
2705  
2710  
2715  
2720  
2725  
2730  
2735  
2740  
2745  
2750  
2755  
2760  
2765  
2770  
2775  
2780  
2785  
2790  
2795  
2800  
2805  
2810  
2815  
2820  
2825  
2830  
2835  
2840  
2845  
2850  
2855  
2860  
2865  
2870  
2875  
2880  
2885  
2890  
2895  
2900  
2905  
2910  
2915  
2920  
2925  
2930  
2935  
2940  
2945  
2950  
2955  
2960  
2965  
2970  
2975  
2980  
2985  
2990  
2995  
3000  
3005  
3010  
3015  
3020  
3025  
3030  
3035  
3040  
3045  
3050  
3055  
3060  
3065  
3070  
3075  
3080  
3085  
3090  
3095  
3100  
3105  
3110  
3115  
3120  
3125  
3130  
3135  
3140  
3145  
3150  
3155  
3160  
3165  
3170  
3175  
3180  
3185  
3190  
3195  
3200  
3205  
3210  
3215  
3220  
3225  
3230  
3235  
3240  
3245  
3250  
3255  
3260  
3265  
3270  
3275  
3280  
3285  
3290  
3295  
3300  
3305  
3310  
3315  
3320  
3325  
3330  
3335  
3340  
3345  
3350  
3355  
3360  
3365  
3370  
3375  
3380  
3385  
3390  
3395  
3400  
3405  
3410  
3415  
3420  
3425  
3430  
3435  
3440  
3445  
3450  
3455  
3460  
3465  
3470  
3475  
3480  
3485  
3490  
3495  
3500  
3505  
3510  
3515  
3520  
3525  
3530  
3535  
3540  
3545  
3550  
3555  
3560  
3565  
3570  
3575  
3580  
3585  
3590  
3595  
3600  
3605  
3610  
3615  
3620  
3625  
3630  
3635  
3640  
3645  
3650  
3655  
3660  
3665  
3670  
3675  
3680  
3685  
3690  
3695  
3700  
3705  
3710  
3715  
3720  
3725  
3730  
3735  
3740  
3745  
3750  
3755  
3760  
3765  
3770  
3775  
3780  
3785  
3790  
3795  
3800  
3805  
3810  
3815  
3820  
3825  
3830  
3835  
3840  
3845  
3850  
3855  
3860  
3865  
3870  
3875  
3880  
3885  
3890  
3895  
3900  
3905  
3910  
3915  
3920  
3925  
3930  
3935  
3940  
3945  
3950  
3955  
3960  
3965  
3970  
3975  
3980  
3985  
3990  
3995  
4000  
4005  
4010  
4015  
4020  
4025  
4030  
4035  
4040  
4045  
4050  
4055  
4060  
4065  
4070  
4075  
4080  
4085  
4090  
4095  
4100  
4105  
4110  
4115  
4120  
4125  
4130  
4135  
4140  
4145  
4150  
4155  
4160  
4165  
4170  
4175  
4180  
4185  
4190  
4195  
4200  
4205  
4210  
4215  
4220  
4225  
4230  
4235  
4240  
4245  
4250  
4255  
4260  
4265  
4270  
4275  
4280  
4285  
4290  
4295  
4300  
4305  
4310  
4315  
4320  
4325  
4330  
4335  
4340  
4345  
4350  
4355  
4360  
4365  
4370  
4375  
4380  
4385  
4390  
4395  
4400  
4405  
4410  
4415  
4420  
4425  
4430  
4435  
4440  
4445  
4450  
4455  
4460  
4465  
4470  
4475  
4480  
4485  
4490  
4495  
4500  
4505  
4510  
4515  
4520  
4525  
4530  
4535  
4540  
4545  
4550  
4555  
4560  
4565  
4570  
4575  
4580  
4585  
4590  
4595  
4600  
4605  
4610  
4615  
4620  
4625  
4630  
4635  
4640  
4645  
4650  
4655  
4660  
4665  
4670  
4675  
4680  
4685  
4690  
4695  
4700  
4705  
4710  
4715  
4720  
4725  
4730  
4735  
4740  
4745  
4750  
4755  
4760  
4765  
4770  
4775  
4780  
4785  
4790  
4795  
4800  
4805  
4810  
4815  
4820  
4825  
4830  
4835  
4840  
4845  
4850  
4855  
4860  
4865  
4870  
4875  
4880  
4885  
4890  
4895  
4900  
4905  
4910  
4915  
4920  
4925  
4930  
4935  
4940  
4945  
4950  
4955  
4960  
4965  
4970  
4975  
4980  
4985  
4990  
4995  
5000  
5005  
5010  
5015  
5020  
5025  
5030  
5035  
5040  
5045  
5050  
5055  
5060  
5065  
5070  
5075  
5080  
5085  
5090  
5095  
5100  
5105  
5110  
5115  
5120  
5125  
5130  
5135  
5140  
5145  
5150  
5155  
5160  
5165  
5170  
5175  
5180  
5185  
5190  
5195  
5200  
5205  
5210  
5215  
5220  
5225  
5230  
5235  
5240  
5245  
5250  
5255  
5260  
5265  
5270  
5275  
5280  
5285  
5290  
5295  
5300  
5305  
5310  
5315  
5320  
5325  
5330  
5335  
5340  
5345  
5350  
5355  
5360  
5365  
5370  
5375  
5380  
5385  
5390  
5395  
5400  
5405  
5410  
5415  
5420  
5425  
5430  
5435  
5440  
5445  
5450  
5455  
5460  
5465  
5470  
5475  
5480  
5485  
5490  
5495  
5500  
5505  
5510  
5515  
5520  
5525  
5530  
5535  
5540  
5545  
5550  
5555  
5560  
5565  
5570  
5575  
5580  
5585  
5590  
5595  
5600  
5605  
5610  
5615  
5620  
5625  
5630  
5635  
5640  
5645  
5650  
5655  
5660  
5665  
5670  
5675  
5680  
5685  
5690  
5695  
5700  
5705  
5710  
5715  
5720  
5725  
5730  
5735  
5740  
5745  
5750  
5755  
5760  
5765  
5770  
5775  
5780  
5785  
5790  
5795  
5800  
5805  
5810  
5815  
5820  
5825  
5830  
5835  
5840  
5845  
5850  
5855  
5860  
5865  
5870  
5875  
5880  
5885  
5890  
5895  
5900  
5905  
5910  
5915  
5920  
5925  
5930  
5935  
5940  
5945  
5950  
5955  
5960  
5965  
5970  
5975  
5980  
5985  
5990  
5995  
6000  
6005  
6010  
6015  
6020  
6025  
6030  
6035  
6040  
6045  
6050  
6055  
6060  
6065  
6070  
6075  
6080  
6085  
6090  
6095  
6100  
6105  
6110  
6115  
6120  
6125  
6130  
6135  
6140  
6145  
6150  
6155  
6160  
6165  
6170  
6175  
6180  
6185  
6190  
6195  
6200  
6205  
6210  
6215  
6220  
6225  
6230  
6235  
6240  
6245  
6250  
6255  
6260  
6265  
6270  
6275  
6280  
6285  
6290  
6295  
6300  
6305  
6310  
6315  
6320  
6325  
6330  
6335  
6340  
6345  
6350  
6355  
6360  
6365  
6370  
6375  
6380  
6385  
6390  
6395  
6400  
6405  
6410  
6415  
6420  
6425  
6430  
6435  
6440  
6445  
6450  
6455  
6460  
6465  
6470  
6475  
6480  
6485  
6490  
6495  
6500  
6505  
6510  
6515  
6520  
6525  
6530  
6535  
6540  
6545  
6550  
6555  
6560  
6565  
6570  
6575  
6580  
6585  
6590  
6595  
6600  
6605  
6610  
6615  
6620  
6625  
6630  
6635  
6640  
6645  
6650  
6655  
6660  
6665  
6670  
6675  
6680  
6685  
6690  
6695  
6700  
6705  
6710  
6715  
6720  
6725  
6730  
6735  
6740  
6745  
6750  
6755  
6760  
6765  
6770  
6775  
6780  
6785  
6790  
6795  
6800  
6805  
6810  
6815  
6820  
6825  
6830  
6835  
6840  
6845  
6850  
6855  
6860  
6865  
6870  
6875  
6880  
6885  
6890  
6895  
6900  
6905  
6910  
6915  
6920  
6925  
6930  
6935  
6940  
6945  
6950  
6955  
6960  
6965  
6970  
6975  
6980  
6985  
6990  
6995  
7000  
7005  
7010  
7015  
7020  
7025  
7030  
7035  
7040  
7045  
7050  
7055  
7060  
7065  
7070  
7075  
7080  
7085  
7090  
7095  
7100  
7105  
7110  
7115  
7120  
7125  
7130  
7135  
7140  
7145  
7150  
7155  
7160  
7165  
7170  
7175  
7180  
7185  
7190  
7195  
7200  
7205  
7210  
7215  
7220  
7225  
7230  
7235  
7240  
7245  
7250  
7255  
7260  
7265  
7270  
7275  
7280  
7285  
7290  
7295  
7300  
7305  
7310  
7315  
7320  
7325  
7330  
7335  
7340  
7345  
7350  
7355  
7360  
7365  
7370  
7375  
7380  
7385  
7390  
7395  
7400  
7405  
7410  
7415  
7420  
7425  
7430  
7435  
7440  
7445  
7450  
7455  
7460  
7465  
7470  
7475  
7480  
7485  
7490  
7495  
7500  
7505  
7510  
7515  
7520  
7525  
7530  
7535  
7540  
7545  
7550  
7555  
7560  
7565  
7570  
7575  
7580  
7585  
7590  
7595  
7600  
7605  
7610  
7615  
7620  
7625  
7630  
7635  
7640  
7645  
7650  
7655  
7660  
7665  
7670  
7675  
7680  
7685  
7690  
7695  
7700  
7705  
7710  
7715  
7720  
7725  
7730  
7735  
7740  
7745  
7750  
7755  
7760  
7765  
7770  
7775  
7780  
7785  
7790  
7795  
7800  
7805  
7810  
7815  
7820  
7825  
7830  
7835  
7840  
7845  
7850  
7855  
7860  
7865  
7870  
7875  
7880  
7885  
7890  
7895  
7900  
7905  
7910  
7915  
7920  
7925  
7930  
7935  
7940  
7945  
7950  
7955  
7960  
7965  
7970  
7975  
7980  
7985  
7990  
7995  
8000  
8005  
8010  
8015  
8020  
8025  
8030  
8035  
8040  
8045  
8050  
8055  
8060  
8065  
8070  
8075  
8080  
8085  
8090  
8095  
8100  
8105  
8110  
8115  
8120  
8125  
8130  
8135  
8140  
8145  
8150  
8155  
8160  
8165  
8170  
8175  
8180  
8185  
8190  
8195  
8200  
8205  
8210  
8215  
8220  
8225  
8230  
8235  
8240  
8245  
8250  
8255  
8260  
8265  
8270  
8275  
8280  
8285  
8290  
8295  
8300  
8305  
8310  
8315  
8320  
8325  
8330  
8335  
8340  
8345  
8350  
8355  
8360  
8365  
8370  
8375  
8380  
8385  
8390  
8395  
8400  
8405  
8410  
8415  
8420  
8425  
8430  
8435  
8440  
8445  
8450  
8455  
8460  
8465  
8470  
8475  
8480  
8485  
8490  
8495  
8500  
8505  
8510  
8515  
8520  
8525  
8530  
8535  
8540  
8545  
8550  
8555  
8560  
8565  
8570  
8575  
8580  
8585  
8590  
8595  
8600  
8605  
8610  
8615  
8620  
8625  
8630  
8635  
8640  
8645  
8650  
8655  
8660  
8665  
8670  
8675  
8680  
8685  
8690  
8695  
8700  
8705  
8710  
8715  
8720  
8725  
8730  
8735  
8740  
8745  
8750  
8755  
8760  
8765  
8770  
8775  
8780  
8785  
8790  
8795  
8800  
8805  
8810  
8815  
8820  
8825  
8830  
8835  
8840  
8845  
8850  
8855  
8860  
8865  
8870  
8875  
8880  
8885  
8890  
8895  
8900  
8905  
8910  
8915  
8920  
8925  
8930  
8935  
8940  
8945  
8950  
8955  
8960  
8965  
8970  
8975  
8980  
8985  
8990  
8995  
9000  
9005  
9010  
9015  
9020  
9025  
9030  
9035  
9040  
9045  
9050  
9055  
9060  
9065  
9070  
9075  
9080  
9085  
9090  
9095  
9100  
9105  
9110  
9115  
9120  
9125  
9130  
9135  
9140  
9145  
9150  
9155  
9160  
9165  
9170  
9175  
9180  
9185  
9190  
9195  
9200  
9205  
9210  
9215  
9220  
9225  
9230  
9235  
9240  
9245  
9250  
9255  
9260  
9265  
9270  
9275  
9280  
9285  
9290  
9295  
9300  
9305  
9310  
9315  
9320  
9325  
9330  
9335  
9340  
9345  
9350  
9355  
9360  
9365  
9370  
9375  
9380  
9385  
9390  
9395  
9400  
9405  
9410  
9415  
9420  
9425  
9430  
9435  
9440  
9445  
9450  
9455  
9460  
9465  
9470  
9475  
9480  
9485  
9490  
9495  
9500  
9505  
9510  
9515  
9520  
9525  
9530  
9535  
9540  
9545  
9550  
9555  
9560  
9565  
9570  
9575  
9580  
9585  
9590  
9595  
9600  
9605  
9610  
9615  
9620  
9625  
9630  
9635  
9640  
9645  
9650  
9655  
9660  
9665  
9670  
9675  
9680  
9685  
9690  
9695  
9700  
9705  
9710  
9715  
9720  
9725  
9730  
9735  
9740  
9745  
9750  
9755  
9760  
9765  
9770  
9775  
9780  
9785  
9790  
9795  
9800  
9805  
9810  
9815  
9820  
9825  
9830  
9835  
9840  
9845  
9850  
9855  
9860  
9865  
9870  
9875  
9880  
9885  
9890  
9895  
9900  
9905  
9910  
9915  
9920  
9925  
9930  
9935  
9940  
9945  
9950  
9955  
9960  
9965  
9970  
9975  
9980  
9985  
9990  
9995  
10000  
10005  
10010  
10015  
10020  
10025  
10030  
10035  
10040  
10045  
10050  
10055  
10060  
10065  
10070  
10075  
10080  
10085  
10090  
10095  
10100  
10105  
10110  
10115  
10120  
10125  
10130  
10135  
10140  
10145  
10150  
10155  
10160  
10165  
10170  
10175  
10180  
10185  
10190  
10195  
10200  
10205  
10210  
10215  
10220  
10225  
10230  
10235  
10240  
10245

Table 1

From	To	Nature of BCSM Transition	Remark
Origination_Attempt_Unauthorized DP	O-Exception	Basic	Newly defined
	Collected_Information PIC	Extended	
	Analyze_Information PIC	Extended	
	Select_Route PIC	Extended	
Authorize_Origination_Attempt PIC	Origination_Attempt_Authorized DP		Existing standard
	O_Abandon		
	O_Exception DP	Basic	
	Origination_Attempt_Unauthorized DP	Basic	Newly defined

The Origination\_Attempt\_Unauthorized DP determined whether or not the authorization failure trigger at the detection point DP 100, as defined in Table 1, is to be activated. When other conditions are satisfied in a state that the trigger is activated, the Origination\_Attempt\_Unauthorized DP performs triggering. The authorization failure trigger is given by subscribers, and a trigger is applied to a call originated by a mobile communication subscriber. The authorization-failure trigger type is set as a reference trigger type for detecting a trigger condition in which a service switching function and a call controlling function are effective at the Origination\_Attempt\_Unauthorized DP.

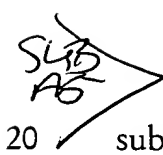
When a disturbance occurs so that the SCP is not able to respond, the corresponding attempted call is terminated or routed to a predetermined place, or is processed as a normal call.

5 Meanwhile, when the triggering condition is satisfied, an origination request instruction on a TIA/EIA-41 is performed. The condition for informing the SCP of the fact that the Origination\_Attempt\_Unauthorized DP is met is given by a subscriber profile.

An operation for processing an attempted call, when the detection point DP100 is applied to the BCSM according to the WIN standard, is described next.

Referring to Figure 6, when a call originating from a terminal is detected by a Point In Call 1 (PIC1), PIC1 performs an event processing for the detected call and the next step is performed for an intelligent network service.

15 A Point In Call 2 (PIC2) performs an authenticating procedure and checks an authorization of the terminal to determine whether the call has been received from a normal subscriber terminal. If the call is determined to have been received from a normal subscriber terminal and authentication and authorization have been given, the general procedures as described above are performed, detailed information of which is thus omitted.

20  Meanwhile, if authentication has failed or if authorization has been denied for the subscriber terminal that attempted the call in the Point In Call 2 (PIC2), corresponding

SLP  
AS

information is preferably detected by the detection point DP100. Then, the detection point DP100 reports the information on the authentication-failed or authorization-denied subscriber to the SCP according to the authorization failure trigger type, which is defined as described above.

5           Thereafter, for the authentication-failed or the authorization-denied call, the DP100 performs an information collection processing through the Point In Call 3 (PIC3), analyzes information through the Point In Call 4 (PIC4), or performs a route selection processing to set up a call through the Point In Call 5 (PIC 5), according to the content of the instruction of the SCP. Thus, the originated call can be connected to a phone number assigned by a legitimate subscriber, or can be connected to a special service equipment such as an IP, or can be subjected to a normal call processing.

In this way, an identification of the corresponding subscriber, determination of the user's legitimacy and a voice announcement service, or the normal call set-up service is provided.

15           Figure 7 is a flow chart of a Basic Call State Model showing a process of an originated call according to a ITU-T standard in an intelligent network in accordance with a preferred embodiment of the present invention.

As shown in Figure 7, when an attempted call fails for authentication or is denied for authorization in the BCSM defined in the ITU-T standard, a detection point (DP200)  
20 preferably reports the authentication failure or the authorization denial to the SCP.

Detection Point (DP200) also collects information on the corresponding originated call, analyzes the information, and selects a route for setting up the call. The shifting in the detection point (DP200) is preferably defined as shown in below Table 2.

Table 2

From	To	Nature of BCSM Transition	Remark
Origination_Attempt_Unauthorized DP	O_Exception	Basic	Newly defined
	Collected_Information PIC	Extended	
	Analyze_Information PIC	Extended	
	Select_Route PIC	Extended	
Authorized_Origination_Attempt PIC	Origination_Attempt_Authorized DP	Basic	Existing standard
	O_Abandon	Basic	
	O_Exception DP	Basic	
	Origination_Attempt_Unauthorized DP	Basic	Newly defined

An Origination\_Attempt\_Unauthorized DP preferably determines whether or not the authorization failure trigger at the detection point DP 200 as defined in Table 2 is to be activated. When other conditions are satisfied while the trigger is activated, the Origination\_Attempt\_Unauthorized DP performs triggering. The authorization failure trigger is preferably given by subscribers. A trigger is applied to a mobile communication

subscriber, a non-ISDN wired subscriber, a BRI service profile, a BRI matching, and a PRI matching. The authorization-failure trigger type is set as a reference trigger type for detecting a trigger condition in which a service switching function and a call controlling function are effective at the Origination\_Attempt\_Unauthorized DP.

- 5           If a disturbance occurs so that the SCP is not able to respond, the corresponding attempted call is terminated or routed to a predetermined place, or is processed as a normal call.

          An operation for processing an attempted call, where the detection point DP200 is applied to the BCSM (Basic Call State Model) according to the ITU-T standard, is described next.

          When a call originating from a terminal is detected by a Point In Call 21 (PIC21), the PIC2 performs an event processing for the detected call and the next step is performed for an intelligent network service.

- A Point In Call 22 (PIC22) performs an authenticating procedure and checks an authorization of the terminal to determine whether the call has been received from a normal subscriber terminal. If the call is determined to have been received from a normal subscriber terminal and authentication and authorization have been given, the general procedures as described above are performed, detailed information of which is thus omitted.
- 15

Meanwhile, if authentication has failed or if authorization has been denied for the subscriber terminal that attempted the call in the Point In Call 22 (PIC22), corresponding information is preferably detected by the detection point (DP200). Then, the detection point (DP200) reports the information on the authentication-failed or authorization-denied subscriber to the SCP, according to the authorization failure trigger type, which is defined as described above.

Thereafter, for the authentication-failed or the authorization-denied call, the detection point DP200 performs an information collection process through the Point In Call 23 (PIC23), performs an information analyzing process through the Point In Call 24 (PIC24), or performs a route selection process to set up a call through the Point In Call (PIC25), according to the content of the instruction of the SCP. Thus, the originated call can be connected to a phone number assigned by a legitimate subscriber, or can be connected to special service equipment, such as an IP, or can be subjected to a normal call processing.

In this way, the identification of the corresponding subscriber, determination of the user's legitimacy and voice announcement service, or the normal call set-up service are provided.

Figure 8 is a flow chart of a Basic Call State Model showing a process of an originated call in an intelligent network of GSM/UMTS, in accordance with a preferred embodiment of the present invention.



As shown in Figure 8, when an attempted call has failed for authentication or has been denied for authorization in the BCSM defined in the intelligent network of GSM/UMTS, preferably using the CAMEL standard, a detection point DP300 is preferably included to report the authentication failure or the authorization denial to the SCP. The detection point (DP300) also preferably collects information on the corresponding originated call, analyzes the information, and selects a route for setting up a call. The shifting in the detection point DP300 is defined as shown in below Table 3.

Table 3

From	To	Nature of BCSM Transition	Remark
Origination_Attempt_Unauthorized DP	O-Exception	Basic	Newly defined
	Analyze_Information PIC	Extended	
	Select_Route and destination response waiting PIC	Extended	
Authorized_Origination_Attempt and collected_Information PIC	Collected_Information DP	Basic	Existing standard
	Origination_Attempt_Unauthorized DP	Basic	Newly defined



on the collected information, routing of the attempted call, and activation of the attempted call can be performed.

Upon analyzing the authentication and authorization, if the call has failed for authentication or has been denied for authorization, corresponding information is  
5 detected by the detection point DP300.

The detection point DP300 then reports the information on the corresponding call subscriber to the SCP according to the trigger type defined as described above. It then proceeds to the PIC42 to analyze the information on the call, or the PIC43 to perform routing for setting up a call and destination response waiting for the call, according to the instruction of the SCP. Thus, the originated call can be connected to a phone number assigned by a legitimate subscriber, or can be connected to a special service equipment such as an IP, or can be subjected to a normal call processing. In this way, the identification of the corresponding subscriber, determination of the user's legitimacy and voice announcement service, or the normal call set-up service can be provided.

15 A procedure of a service for setting up a call when an authentication failure and/or authorization denial have been detected in accordance with the present invention will now be described. First, a service procedure for an attempted call in an intelligent network of the North American will now be described with reference to Figures 5, 9A, and 9B.

Figures 9A and 9B are a flow chart depicting a call connection service between a terminal and a switching system where an originated call is authentication-failed or authorization-denied in the communication network service of the WIN standard in accordance with a preferred embodiment of the present invention,

5 First, in a mobile communication service network, when a call originating from a terminal 10 is detected by the MSC/VLR 20 (S501). The MSC/VLR 20 then performs authentication on the detected call using an authentication request message received from an HLR (not shown) or an authentication center (S502).

If the MSC/VLR 20 fails to authenticate the terminal that originated the call, or the MSC/VLR fails to authorize the subscriber for some reason, the Origination\_Attempt\_Unauthorized detection point detects that (S503)(S400).

10 Next, in the Origination\_Attempt\_Unauthorized detection point, when an authorization failure trigger (Authorization\_Failure Trigger) is not in an activated state in the profile of the originating call subscriber, the MSC/VLR 20 transmits an appropriate announcement to the terminal 10 that attempted the call. It then releases the call and every resource (S504) (S410, S420). The appropriate announcement is preferably provided by the MSC/VLR.

15 Meanwhile, if the authorization failure trigger is in an activated state in the profile of the originating call subscriber, the MSC/VLR 20 transmits an origination request instruction message (OriginationRequest INVOKE message) to the SCP 30 that handles

the corresponding trigger (S505)(S430). The origination request instruction message preferably includes a parameter representing a reason of the authentication failure or the authorization denial for the subscriber and current location information on the subscriber.

5           The SCP 30 preferably analyzes the reason for the authentication failure or the authorization denial of the subscriber terminal 10 that attempted the call and the location information of the corresponding terminal 10 of the received call origination request instructing message (OriginationRequest INVOKE message). This is done based on the subscriber profile, and the history of authentication failures and the authorization denial. The SCP 30 also stores necessary matter, and selects the next routine for performing.

Specifically, if the SCP 30 determines that the attempted call of the corresponding subscriber terminal 10 has to (A) be connected with an operator of a service center that handles the corresponding authentication failure or the authorization denial or (B) be connected with a phone number assigned by the legitimate subscriber of the  
15           corresponding terminal 10, the SCP 30 preferably includes (A) a routing number for routing to the service center that handles the corresponding authentication failure or the authorization denial or (B) the phone number assigned by the legitimate subscriber of the corresponding terminal 10, in the origination request return result message (OriginationRequest RETURN RESULT message). The SCP 30 also selectively includes  
20           the content that the Calling Party Number is to be provided to the called party in the

OriginationRequest RETURN RESULT message. Then, the SCP 30 transmits the OriginationRequest RETURN RESULT message to the MSC/VLR 20 (S508).

If, on the other hand, the SCP 30 determines that the subscriber terminal 10 that attempted a call is to be connected to the IP 50 so that it can be informed of a specific voice announcement, and if a routing number to the IP 50 for transmitting the specific voice announcement is known, the SCP 30 includes the corresponding routing number in the origination request return result message (OriginationRequest RETURN RESULT message) and transmits it to the MSC/VLR 20 (S508).

When, however, the SCP 30 determines that the subscriber terminal 10 that attempted a call is to be connected to the IP 50 so that it can be informed of a specific voice announcement, and a routing number for routing to the IP 50 for transmitting the specific voice announcement is not known, the SCP 30 preferably requests a resource seizure instruction from the IP 50 for providing the specific voice announcement to the corresponding subscriber who attempted the call (S506). The SCP 30 receives the resource seizure return result message carrying a TLDN (Temporary Local Directory Number) for accessing the announcement from the IP 50 (S507), and includes the TLDN in the OriginationRequest RETURN RESULT message and transmits it to the MSC/VLR 20 (S508).

Next, if the SCP 30 determines that the attempted call by the subscriber is to be processed as a normal call, the SCP 30 preferably transmits the OriginationRequest

RETURN RESULT message carrying a parameter instructing proceeding of the normal call to the MSC/VLR 20 (S508). The message may include a parameter instructing the transmission of a specific announcement provided in the MSC.

Meanwhile, if the SCP 30 determines that call processing is to be stopped and every resource is to be retrieved, the SCP 30 includes a content instructing stoppage of processing of the call in the origination request return result message and transmits it to the MSC/VLR 20 (S508).

The MSC/VLR 20 then performs an appropriate connection for the authentication-failed or authorization-denied call according to the origination request return result message received from the SCP 30.

If the origination request return result message received from the SCP 30 contains instructions to connect to a specific routing number or a destination number, and if the instruction is to set up a call to a phone number of the specific operator of the service center or to a phone number that has previously been assigned by a legitimate subscriber of the corresponding terminal 10, the MSC/VLR 20 connects the call originating from the terminal 10 to the service center or to a previously assigned subscriber 40 (509).

If, however, the instruction is to set up a call to the IP 50, the MSC/VLR 20 sets up a call between the call originating from the terminal 10 and the IP 50 (S510). Next, if the instruction is to perform a normal call process, the MSC/VLR 20 connects the calling party and the called party 60 (S511).

Finally, if the instruction is to stop call processing for the corresponding originating call, the MSC/VLR 20 releases the corresponding originating call (S512).

In step 509, if the MSC/VLR 20 sets up a call to the operator of the service center that handles the authentication failure or the authorization denial, the service center  
5 checks an identification of the subscriber who attempted the call and determines his or her legitimacy.

If he or she is determined to be disqualified, the service center leads him or her to retrieval of the terminal and guides him or her to a normal service, or determines whether the service should be disconnected against the corresponding subscriber. It then records the corresponding content to reflect it in the service profile as required.

If the subscriber delays payment of a service fee, the subscriber is preferably informed of the corresponding matter through a voice announcement to guide him or her to a normal service.

If the authentication has failed or the authorization has been denied even though  
15 the subscriber is qualified, a measure is taken to normalize the service for the corresponding subscriber as early as possible or a necessary announcement service is provided to the subscriber.

When the MSC/VLR 20 sets up a call to a phone number that has previously been assigned by a legitimate subscriber for the attempted call by the subscriber, the previously



assigned called party confirms the identification of the calling party so that the terminal can be retrieved.

In step 510, when a call is connected between the MSC/VLR 20 and the IP 50, the IP 50 preferably transmits a voice announcement corresponding to the destination routing number to the subscriber, and when the announcement is completely transmitted, the set-up call is preferably ended.

In step 511, the MSC/VLR 20 sets up a call to the number called by the subscriber for the authentication-failed or authorization-denied call, and provides a normal service.

If the SCP 30 receives the origination request instructing message, including the parameter indicating the reason of the authentication failure or the authorization denial for the subscriber and the current location information of the subscriber from the MSC/VLR 20, and if the SCP 30 connects a call originating from the subscriber with the service unit such as the IP 50, the subscriber and the service unit are mutually operated to each other. At this time, if the SCP 30 determines that a special service is to be performed, the SCP 30 requests a resource seizure instruction from the IP 50 to perform the special service.

Upon receiving the seize resource instruction from the SCP 30, the IP 50 transmits the resource seizure return result message carrying the TLDN that provides access to the assigned resource, to the SCP 30 (S514).

Then, in accordance with the TLDN includes in the resource seizure return result message, the SCP 30 transmits a message to the MSC/VLR 20 instructing the resource connection (S515). The MSC/VLR 20 this sets up a call between the terminal 10 that originated the call and the IP 50, by using the TLDN.

5 When the call is set up between the terminal 10 and the IP 50, the IP 50 detects the connection of the call to the TLDN assigned for a resource for performing a special service, informs the SCP 30 of it, and transmits a command request instructing message (InstructionRequest RETURN RESULT message) to the SCP 30, to request information as to what process is to be performed for the corresponding call (S517).

10 According to the command request instruction message, when the SCP 30 transmits the specific resource function command instructing message for a content instructing an operation for an assigned resource to the IP 50 (S518), the IP 50 performs an operation as instructed by the special resource function command instructing message for the assigned resource in association with the call-originating subscriber (S519).

15 When the mutual operation between the call-originating subscriber and the IP 50 is terminated, the IP 50 transmits a special resource function command return result including information on the result, to the SCP 30.

Then, the SCP 30 includes the content of the special resource function command return result in the origination request return result message, and transmits it to the

MSC/VLR 20 (S521). The SCP30 also transmits the command request return result to the IP 50 (S522).

Upon receiving the instruction of the origination request return result message from the SCP 30, the MSC/VLR 20 either sets up a new call or releases a call (S523, S524)(S440, S450).

A service procedure for an attempted call according to the ITU-T standard in accordance with a second preferred embodiment of the present invention will now be described with reference to Figures 5, 10A, and 10B.

Figures 10A and 10B are a flow chart illustrating a call connection service between a terminal and a switching system when an originated call is subject to an authentication failure or an authorization denial in the communication network service of the ITU-T standard.

In a mobile communication service network, when a call originating from a terminal 10 is detected by a switching system/SSP 20A (S601), the switching system/SSP 20A performs authentication on the detected call (S602).

If the switching system/SSP 20A fails to authenticate the terminal that originated the call, or if the switching system/SSP 20A fails to authorize the subscriber for some reason, the Origination\_Attempt\_Unauthorized detection point (S503)(S400) detects that. (S603)(S400).

In the Origination\_Attempt\_Unauthorized detection point, if an authorization failure trigger is not in an activated state in the profile of the originated call subscriber, the switching system/SSP 20A transmits an appropriate announcement to the terminal 10 which attempted the call, and releases the call and every resource (S604) (S410, S420). The appropriate announcement is preferably provided by the MSC/VLR.

Meanwhile, if the authorization failure trigger is in an activated state in the profile of the originated call subscriber, the switching system/SSP 20A transmits an initial detection point message (Initial DP message) to the SCP 30 that handles the corresponding trigger (S605)(S430). The initial DP message preferably includes a parameter representing a reason of the authentication failure or the authorization denial for the subscriber, and selectively, current location information on the subscriber.

The SCP 30 preferably analyzes the reason for the authentication failure or the authorization denial of the subscriber terminal 10 that attempted the call and the location information of the corresponding terminal 10 of the received call origination request instructing message. This is done based on the subscriber profile and the history of authentication failures and the authorization denial. The SCP30 also stores necessary matter, and selects the next routine for performing.

If the SCP 30 determines that the attempted call of the corresponding subscriber terminal 10 is to be (A) connected with an operator of a service center that handles the corresponding authentication failure or the authorization denial or (B) connected with a

phone number assigned by the legitimate subscriber of the corresponding terminal 10, the SCP 30 transmits (A) a connection message including the routing number to the operator of the service center that handles the corresponding authentication failure or the authorization denial or the phone number assigned by the legitimate subscriber of the corresponding terminal 10 to the switching system/SSP 20A.

Meanwhile, if the SCP 30 determines that the subscriber terminal 10 that has attempted a call is to be connected to the IP 50 so that it can receive a specific voice announcement, the SCP 30 includes the routing number to the IP 50 that transmits the special voice announcement in the connection message, and transmits it to the switching system/SSP 20A (S606).

The switching system/SSP 20A preferably performs a corresponding operation according to the instruction of the connection message from the SCP 30.

If it instructs a connection to a specific routing number or a destination number, if it is an instruction to set up a call to a phone number of the specific operator of the service center or a phone number that is previously assigned by a legitimate subscriber of the corresponding terminal 10, the switching system/SSP 20A sets up a call between the call-originating subscriber and the service center or between the call-originating subscriber and the previously assigned destination 40 (S607).

Meanwhile, if it is an instruction to set up a call to the IP 50, the switching system/SSP 20A sets up a call between the call-originating subscriber and the IP 50 (S608).

If the SCP 30 determines that the call originating from the subscriber is to be processed as a normal call and thus transmits a related message to the switching system/SSP 20A, the called party 60 of the phone number called by the call-originating subscriber is called. A call is thus set up between the call-originating subscriber and the called party 60 and communication is established (S609)(S610).

If the SCP 30 determines that call processing is to be stopped and every resource is to be retrieved, the SCP transmits a call release message to the switching system/SSP 20A (S611).

As described above, if the switching center/SSP 20A sets up a call to the operator of the service center that handles the authentication failure or the authorization denial, the service center checks identification of the subscriber who attempted the call, and determines his or her legitimacy.

If he or she is determined to be a disqualified user, the service center leads him or her to retrieval of his or her terminal and guides him or her to a normal service. Alternatively, it determines whether the service is to be disconnected against the corresponding subscriber, and then records the corresponding content to reflect it in the service profile as required.

If the subscriber delays payment of a service fee, the subscriber is informed of the situation through a voice announcement to guide him or her to a normal service. If the authentication has failed or the authorization has been denied, even though the subscriber

is qualified, a measure is taken to normalize the service for the corresponding subscriber as quickly as possible, or a necessary announcement service is provided to the subscriber.

When a call is set up to a phone number that has previously been assigned by a legitimate subscriber for the attempted call by the subscriber, the previously assigned  
5 called party confirms the identification of the calling party so that the terminal can be retrieved.

In order to provide a special service to the call-originating subscriber by using the resource of the IP 50, the SCP 30 preferably transmits a resource connection message carrying address information for the corresponding special IP resource to the switching system/SSP 20A (S613). At the same time, the SCP30 transmits a message requesting an announcement transmission to the IP 50 (S614).

The switching system/SSP 20A then sets up a call to the address of the IP 50 assigned by the SCP 30 in the resource connection message, and the specific service procedure is performed by the mutual operation between the IP and the call-originating  
15 subscriber (S615) (S440, S450).

In a third different embodiment, a service procedure for an attempted call according to the CAMEL standard will now be described with reference to Figures 5, 11A, and 11B.

Figures 11A and 11B illustrate a call connection service between a terminal and a switching system when the originating call is subject to an authentication failure or an authorization denial in the communication network service of the CAMEL standard.

In a mobile communication service network, when a call originating from a terminal 10 is detected by an MSC/VLR/gsmSSF 20C (S701), the MSC/VLR/gsmSSF 20C performs an authentication on the detected call (S702). If the MSC/VLR/gsmSSF 20C fails to authenticate the terminal that originated the call or the MSC/VLR/gsmSSF 20C fails to authorize the subscriber for some reason, the Origination\_Attempt\_Unauthorized detection point detects that (S703)(S400).

In the Origination\_Attempt\_Unauthorized detection point, when an authorization\_Failure Trigger is not in an activated state in the profile of the originated call subscriber, the MSC/VLR/gsmSSF 20C transmits an appropriate announcement, that is provided in itself, to the terminal 10 that attempted the call, and releases the call and every resource (S704) (S410, S420). The appropriate announcement is preferably provided by the MSC/VLR.

Meanwhile, if the authorization failure trigger is in an activated state in the profile of the originating call subscriber, the MSC/VLR/gsmSSF 20C transmits an initial detection point message to the SCP 30 that handles the corresponding trigger (S705)(S430). The initial detection point message preferably includes a parameter representing a reason



for the authentication failure or the authorization denial for the subscriber and selectively current location information on the subscriber.

The SCP 30 preferably analyzes the reason for the authentication failure or the authorization denial of the subscriber terminal 10 that attempted the call and the location information of the corresponding terminal 10 of the received call origination request  
5 instructing message. This is done based on the subscriber profile and the history of authentication failures and the authorization denial. The SCP30 also stores a necessary matter, and selects the next routine to perform.

If the SCP 30 determines that the attempted call of the corresponding subscriber terminal 10 be (A) connected with an operator of a service center that handles the corresponding authentication failure or the authorization denial or (B) connected with a phone number assigned by the legitimate subscriber of the corresponding terminal 10, the SCP 30 transmits (A) a connection message including the routing number to the operator of the service center that handles the corresponding authentication failure or the  
15 authorization denial (B) or the phone number assigned by the legitimate subscriber of the corresponding terminal 10 to the switching system/SSP 20A.

Meanwhile, if the SCP 30 determines that the subscriber terminal 10 that attempted a call is to be connected to the IP 50 so that it can be informed of a specific voice announcement, the SCP 30 includes the routing number to the IP 50 that transmits the

special voice announcement in the connection message, and transmits it to the MSC/VLR/gsmSSF 20C (S706).

At this time, the MSC/VLR/gsmSSF 20C preferably performs a corresponding operation according to the instruction of the connection message from the SCP 30.

5 If the instruction indicates that a connection be set up to a specific routing number or a destination number, if it is an instruction to set up a call to a phone number of the specific operator of the service center or a phone number that is previously assigned by a legitimate subscriber of the corresponding terminal 10, the MSC/VLR/gsmSSF 20C sets up a call between the call-originating subscriber and the service center or between the call-originating subscriber and the previously assigned destination 40 (S707).

Meanwhile, if it is an instruction to set up a call to the IP 50, the MSC/VLR/gsmSSF 20C sets up a call between the call-originating subscriber and the IP 50 (S708).

15 In order to provide a special service to the call-originating subscriber by using the resource of the IP 50, the SCP 30 preferably transmits a resource connection message carrying address information on the corresponding special IP resource to the MSC/VLR/gsmSSF 20C (S713), and at the same time, transmits a message requesting an announcement transmission to the IP 50 (S714).

20 The MSC/VLR/gsmSSF 20C then sets up a call to the address of the IP 50 assigned by the SCP 30 in the resource connection message, and the specific service procedure is

performed by the mutual operation between the IP and the call-originating subscriber (S715) (S440, S450).

The method for processing authorization failed/authorization denied subscribers by intelligent network according to the preferred embodiments of the present invention has many advantages. For example, the call originating from a subscriber for authentication is denied for authorization, an effective measure is taken and various services are provided. Additionally, an illegally copied and used terminal is detected to thereby protect the legitimate subscriber from damage. Also, a lost or stolen terminal can be retrieved and returned to its owner.

In addition, an effective announcement service is provided to the authorized-denied subscriber, and a payment delay situation can be informed to the subscriber who has delayed a payment for a service fee, leading him or her to a normal service.

Also, if a legitimate subscriber has failed for authentication and is thus not provided a normal service for some reason, the situation can be quickly recognized and a suitable measure can be taken, thereby providing a normal service to the legitimate subscriber.

Moreover, if a call originated by a subscriber for authentication or is denied for authorization, the call can be automatically traced and its history can be automatically maintained. In this manner, for the call originated by an authentication-failed and authorization-denied subscriber, a communication network provider can have various methods, that are suitably adopted according to the situations.

The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. In the claims, means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents but also equivalent structures.

5

0975099-010201